

# CONSTRUCTING SYSTEM FOR EFFICIENT INFORMATION DISSEMINATION IN PUBLIC SERVICES

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## Abstract

*Information dissemination has played an important role for public services. Disaster information, public gathering invitations, and imposed new rules are a few important examples of information dissemination. However, there is few research that began investigating the structure of the information distribution for the purpose of public service. In this study, we developed a system to efficiently disseminate information to the public service. We examine the hierarchy and organization of information types in the district (villages) in Surabaya and trying to develop a general model for the dissemination of information in the public service. The results of this study are integrated information dissemination sites capable of sending short message service (SMS). The website can be accessed online at [www.keputih.org](http://www.keputih.org).*

**Keywords:** *Information Systems Development, Waterfall, SMS Gateway.*

## 1 Introduction

Information dissemination is crucial to maintain the relationship between government and its people. Information dissemination encompasses all information distribution carried out by the government to its people such as disaster information, health information, community gathering invitation and new imposed regulation [1][2].

Previous study has proposed government's mechanism to effectively disseminate information such as for managing flood mitigation in Jakarta [3]. The study has suggested the organizational structure to cope up with flood mitigation. However it did not explicitly explain the transformation from organization structure to IT infrastructure to enable the mitigation concepts.

The government undertakes the Information dissemination in a one-way communication. In this situation, as the information is produced, the government reactively broadcast information to its people without allowing its people to response back.

This study examines the best configuration of one-way information distribution for sub-district government (Indonesian: Kelurahan). The major constraint of information dissemination is the broadcasting cost. Traditionally, government uses short messages or offline papers to broadcast information to community leaders (Indonesian: RT/RW) and wishes the community leader will pass the information to their subordinates. The government tends to avoid using social media such as twitter or facebook to broadcast information for the coverage issues. Here, some of the community leaders are less familiar with the technology and less using the smartphones.

The study case takes place in Kelurahan Keputih, East Surabaya. Kelurahan Keputih is a subdistrict under Kecamatan Sukolilo. The population in the Keputih is around 120.000 people which most of them are new entrants from other sub-districts in Surabaya since Keputih is a new expansion of Surabaya municipality.

## 2 Discussion

We employ waterfall model in developing our proposed system. The advantages of waterfall model are in twofold: 1) ease of use (easy to implement since it is sequential and linear) and 2) small amount of resources required to implement the model [3]. Nevertheless, in order to apply the model, the basic requirements should be captured and up front defined. In this development, the requirements have been clearly defined and documented. The following figure depicts the steps involved in Waterfall model [4].

There are six stages in Waterfall model (see Fig 1). The first stage is defining system requirements (functional and non-functional requirements). After that, we design the proposed systems based on the defined requirements. Next is to implement design into coding (also called as construction phase). The built system then will be tested in the following step before its deployment phase. In deployment stage, the proposed system will be installed in the organization, and some training will be conducted. The last stage is maintaining the deployed system in order to keep its performance to meet business needs and customer expectation.

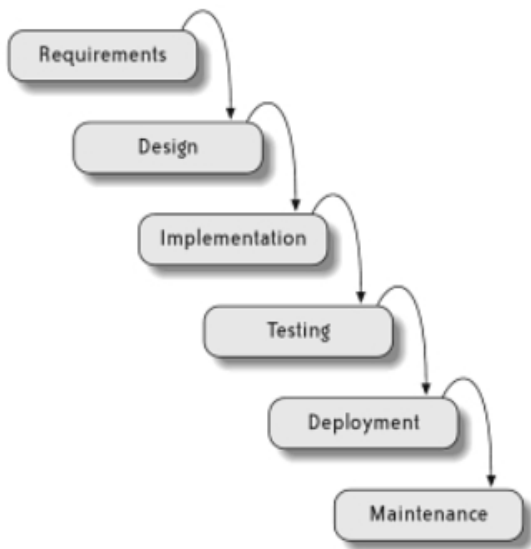


Fig 1. Waterfall Approach [4]

## 2.1 The Characteristics of the Information

This section provides explanation about the types of information that the government has. Information dissemination is mostly related to the execution of the regular government programs. There are many organizations within government that launch programs such as city programs, province programs, and ministerial programs. In terms of the sub-district, all programs are the localized extensions of the municipal government programs. Here localization means that the program is developed and delivered by considering local social structure without losing the core means.

In general, the selection of the information dissemination method is highly relied on twofold: the parties involved in the operation and the decision whether the program is owned by sub-district (see Table 1).

Table 1. How sub-district disseminate information

Type	Nature of the information		
	Involving other parties other than sub-district government?	Sub-district program?	Information Dissemination method(s)
1	NO	NO	Distributing letter
2	NO	YES	Sending Short message
3	YES	YES	Distributing letter and Sending short message

Involved Parties are other government institutions or private institutions (such as company or formal non-

governmental organization) that actively participate in the enactment of the program. The example of the program with involved parties is the eradication of the dengue. During eradication, the sub-district should coordinate with a health centre (Puskesmas). Here, health centre is not a sub-ordinate of the sub-district, but instead it is a direct sub-ordinate of the Health Department in the municipal government.

Short messages are used to inform something that requires strong awareness but less in detail. In the other hand, distributing letter requires detail information but in a weak awareness. The combination of both methods means that the information should be strong aware and quite detail. Typically, sub-district government sends short message first prior sending the letter. The span between the short message and the letter is around two or three days. This condition is held to anticipate the necessity of immediate community gathering preparation (such as inviting community members) in order to discuss the best way fulfilling the demand of the incoming letter.

## 2.2 Information Dissemination in the Hierarchy

This section describes the hierarchy of the sub-district government and the flow of the information dissemination. The information dissemination hierarchy follows basic organizational structure of sub-district government. The highest level of information dissemination is sub-district. Under sub-district there are RW and RT. Every sub-district will have more than two RWs and every RW has more than two RTs [5].

The hierarchy is not a commando's hierarchy by de-jure. Here, the RTs and RWs are community built organization structures. They are independent each other but formed to assist the government's program execution. However, in reality the hierarchy is a commando one. Since the hierarchy is a commando one, the sub-district can ensure that the program will be somehow informed below as long as no broken chains.

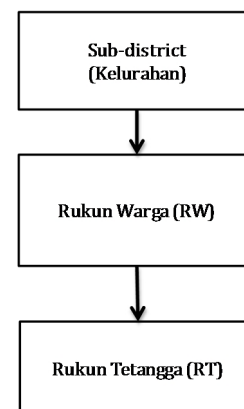


Fig 2. Information Dissemination Hierarchy

The information flow takes in several steps (see Fig 2). First, whenever sub-district accepts the information, it will pass the information to the RWs. Second, the RW will hand over the information to its sub-ordinate (RTs).

The advantage of this information dissemination hierarchy is that the quality of the information is its maintainability level, as the information sources are traceable, reliable, and trustable. The disadvantage of the information dissemination hierarchy is that the potential bottleneck as if the parties accidentally eliminated due to physical condition or other reasons. For example, one RW suddenly cannot be contacted due to long business trips, as the result, the information will not be successfully distributed on time.

## 2.3 System Analysis and Design

In Section 4, we have explained that the broken chain in the information dissemination hierarchy may hinder the speed of information dissemination. Therefore, an integrated online system is necessary to construct in order to maintain the time aspect and the quality aspect of the information. The online system is not intended to replace traditional system, but instead it helps to close the disadvantage aspect of traditional system.

### A. Functional Requirements

This section explains the functional requirements of the system. The functional requirements are necessary to provide basic features of the system. The functional requirements are what the system must have and must able to perform in order to meet business needs and customer expectations. Below are the functional requirements:

1. System can display information related sub-district government (FR01)
2. System can send short messages to the group for any update information (FR02)
3. System can send short messages to individuals related to the latest information (FR03)
4. System can add relevant information related to the sub-district (FR04)
5. System can dynamically manage menu (FR05)
6. System can receive social commentary media (e.g. facebook) in any information submitted via the website (FR06)
7. System can upload the documents relating to any information on the website.(FN07)
8. System can manage account (FN08)
9. System can manage templates (header, image, background) (FN09)
10. System can manage contact information of RTs and RWs (FN10)

Based on the mentioned requirements, there are three major features of the proposed system, namely 1) Information Management, 2) Message Management, and 3) Menu Management. The following table maps each requirement to each feature (see Table 2).

**Table 2. System Features**

Information Management	Message Management	Menu Management
FR01	FR02	FR05
FR04	FR03	FR08
FR06	FR10	FR09
FR07		

### B. Non Functional Requirements

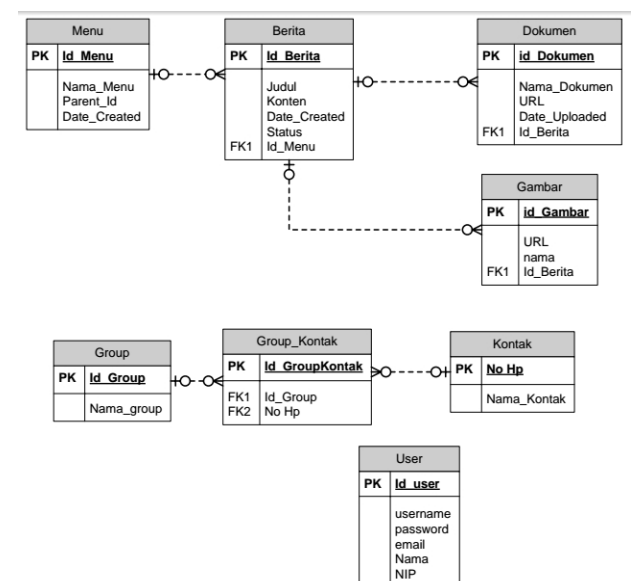
This section explains the non-functional requirements of the system. The non-functional requirements describe the quality attributes of the system, which are mentioned as follows:

1. System can distribute up to 10 messages per second (NFR01)
2. System is available 24 hours a day with SLA 90% (NFR02)
3. The SMS Server can be easily configured and deployed in different PCs (NFR03)
4. System can be compatible in any browser (NFR04)

### C. Entity Relationship Diagram (ERD)

In the ERD, we have defined seven entities naming Menu, Berita (news), Dokumen (Document), Gambar (Picture), Group, Group\_Kontak (Contact\_Group), Contact, and User (see Fig 3).

Every entity will become a table in the database. Menu is responsible for making dynamic menu in the website. Every menu has at least one berita (news) in which information is put. Every berita (news) has either document (in PDF or doc format) as well as Gambar (Picture).



**Fig 3. Entity Relationship Diagram of Information Dissemination**

We have developed four tables entitled: Group, Group\_Kontak, Kontak and User to maintain the contact for short messages. Every community will be clustered into one single group. Every people will have one contact and registered in the database. Some people then are grouped into one or two groups in table group\_kontak. As we need to send short message to one group we query the group contact to find out all the member of this particular group.

#### D. System Architecture

We employ an online webserver that is connected to sms server (Fig 4). The webserver is responsible to any request to information. The webserver itself can be accessed from various workstations since it is connected to the internet. For web server, we use Apache and PHP under Linux environment. For database, we use MYSQL and for sms server we use GAMMU. Gammu is an SMS API that is very useful to manage sms for GSM provider. SMS Server can be deployed either integratedly or separately with the webserver.

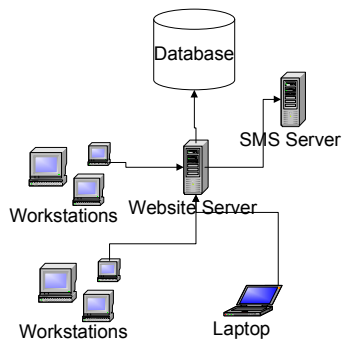


Fig 4. The architecture of information dissemination website

### 2.4 The System Testing and Implementation

For system testing, we utilize blackbox testing to evaluate our proposed system. We defined a set of testcases based on the defined functional requirements. Here is an example of testcases applied (Table 3).

Table 3. Testcase Example

Test Case ID: TC01			Test Designed by: AS			
Test Priority (Low/Medium/High): High			Test Designed date: 10 Oct 2014			
Module Name: Message Management			Test Executed by: AS, AW			
Test Title: Disseminating information by sending sms			Test Execution date: 12 Oct 2014			
Description: Test the function of sms gateway by sending some information						
Pre-conditions: RT/RW contacts are available in the system						
Dependencies:						
Step	Test Steps	Test Data Message: "This is a testing message. Please ignore"	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	User create new message					
2	User click send button without defining receivers	Null	There will be error message stating that there is no receiver selected and system could not send the message	There is no error message occurred and system could not send the message	Fail	
3	User select some receivers from contact list	Name: "Arif Wibisono", "Amma", "Febry"	List of selected contacts are added to receiver list	System successfull added the selected contacts to receiver list	Pass	
4	User click send button		System sends message to the receivers and shows a message stating that message has been successfull delivered	System successfull sent message to receivers, but there was no message stating that message has been successfull delivered by the system	Fail	
Post-conditions: User is able to disseminate information by sending sms. The selected receivers accept the message.						

Based on the test, there were several refinements executed so that all functions are working properly.

Mostly, the errors occurred in terms of pop-up messages that were not shown during testing phase and inconsistency of user interface. Overall, the proposed system can work well and perform expectedly.

Below are the implementations of the information dissemination system. The system is freely available at [www.keputih.org](http://www.keputih.org). The system consists of two: the website, which is connected with social media, and the SMS server to broadcast information through short messages. While the website is available for anyone, the SMS server is only available for sub-district staff. Here are some screen shoots of our system.

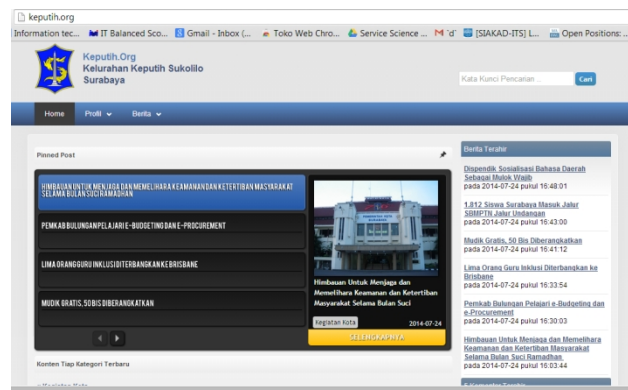


Fig 5. Home page of keputih.org

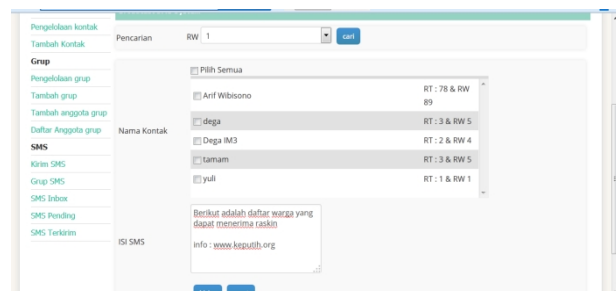


Fig 6. Menu for disseminating information using SMS

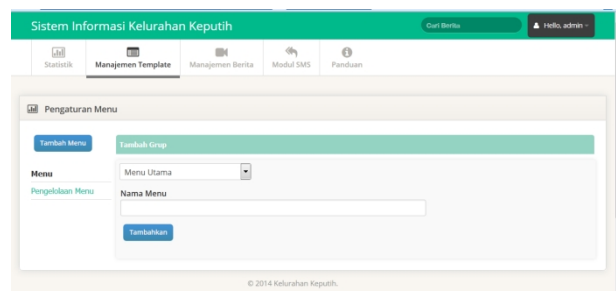


Fig 7. Menu for managing website menu

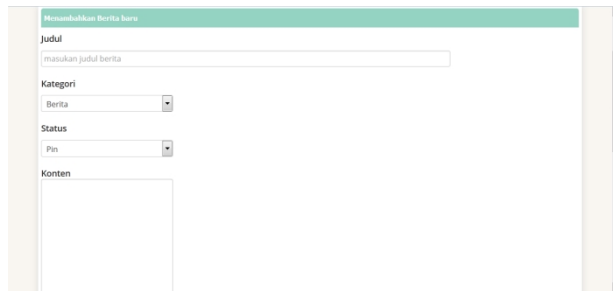


Fig 8. Menu for creating new information

### 3 Summary and Further Works

This study outlines the information dissemination system for public services. We discuss about how the information is grouped and delivered to people within sub district. We use study case from one sub-district (kelurahan) in Surabaya namely Keputih. There are three major features of the proposed system, namely Information Management, Message Management, and Menu Management. The features represent the ability of system to perform information dissemination through either website or sms gateway easily and in timely manner. Each feature comprises several functional requirements which are designed to meet information dissemination purposes. Moreover, the developed system has been launched through the internet and can be easily accessed. Further works might pertain the integration between system and smartphones to increase accessibility. Additionally, adopting performance-testing method to assess system performance will be other issue to improve the quality of the system.

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